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Published in:
Journal of Evaluation in Clinical Practice

DOI:
10.1111/j.1365-2753.2010.01363.x

Publication date:
2011

Journal of Evaluation in Clinical Practice
International Journal of Public Health Policy and Health Services Research

Journal of Evaluation in Clinical Practice ISSN 1356-1294

RESEARCH LETTER

Organization of diabetes primary care: a review of interventions that delegate general practitioner tasks to a nurse

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Accepted for publication: 4 August 2009

doi:10.1111/j.1365-2753.2010.01363.x

To the editor

The multifaceted and complex nature of diabetes care makes good organization of diabetes care within primary care important [1–3]. This has led to new health care models. One potentially promising approach to developing new models in diabetes care is the use of multidisciplinary cooperation [4]. A multidisciplinary team of primary care professionals – general practitioner (GP), practice nurse, diabetes specialist nurse and dietician – may well satisfy the high demands of diabetes care. In this kind of cooperation tasks can be delegated from one type of health professional to another, for instance from doctor to nurse [4,5]. Care models may be promising but the effects of task delegation to a nurse in diabetes primary care are still unclear. The aim of this study was to summarize the evidence as regards the effects of task delegation from GP to nurses in diabetes primary care.

Methods

Identification of studies

A literature search was performed for studies published between 1990 and December 2008 in Medline and Cinahl (Cumulative Index of Nursing and Allied Health Literature). The keywords used were 'Diabetes Mellitus' in combination with 'integrated care', 'shared care', 'delegation, professional', 'nurse', 'nurse's role', 'multidisciplinary care', 'patient care team' and 'physician-nurse relation'. The studies had to meet the following inclusion criteria: to use a sample of adult patients with diabetes type 2: provide an evaluation of an intervention involving the delegation of GP tasks to a nurse; have a follow-up of at least 6 months, and be published in a peer-reviewed journal. Studies were excluded if the nurse only provided a short intensive programme or was restricted to educating health care professionals. These where not considered to be full delegations of task. We included randomized controlled trials and other comparative study designs such as non-randomized trials, and before–after comparisons.

Quality assessment

To rate the quality of the selected studies we used a checklist developed by Downs and Black, intended for use in both randomized and non-randomized studies [6]. A maximum total score of 32 could be achieved. Studies with a score less than or equal to 16 were considered to be of low quality.

Reporting and analysing

We compared the following parameters: glycosylated haemoglobin (HbA1c), blood pressure and lipid values. These clinical outcomes are important for the management of diabetes [7–9]. A difference was considered statistically significant if $P < 0.05$.

Results

Study selection

The literature search resulted in 1133 publications from Medline and an additional 206 studies from Cinahl. Of these publications 204 (172 Medline, 32 Cinahl) required further assessment. In the second stage, another 194 articles were excluded. The reasons for

Table 1 Characteristics of the studies included on task delegation from GPs to nurses

Author (Reference)	Setting	GP task delegation towards	Tasks nurse	Design	Sample size		Comparison I and C with respect to change from baseline	Quality score
					I	C		
Aubert [10]	2 primary care clinics	Nurse case manager	Follows a set of detailed management algorithms: systematic adjustment in medication, meal planning, reinforcement of exercise, close follow-up. Reviews patient progress and medication adjustments with doctor and endocrinologist biweekly. Nurse is primary care provider.	RCT	71 (83% type 2)	67 (92% type 2)	Yes	21
Cleveringa [11]	113 practices	PN	Delegation of routine diabetes care tasks to nurses, who used software that supports management and medical decisions. Treatment changes were performed by the PN after they were approved by the PCP.	PP	7893	–	NA	22
Forbes [12]	4 nurse-GP pairs	District nurse	The assessment took the form of an annual review. This involved a comprehensive assessment of glycaemic and metabolic control, together with the identification of any diabetes complications and lifestyle factors.	PP pilot project	12	–	NA	11
Gabbay [13]	2 primary care clinics	Nurse case manager	The nurse implemented specific diabetes management algorithms. The patient was seen by a nurse at least every 4 months. Behavioural goal-setting, established individualized care plan, provided patient self-management education and surveillance of patients, referred to diabetes nurse educator or dietician, ordered protocol-driven laboratory test, tracked outcomes using computerized data registry and made therapeutic recommendations with approval of PCP.	RCT	150	182	Yes	19
Groeneveld [14]	15 general practices	DSN, dietician	Intake procedure: physical and laboratory examination, and subsequent counselling. Patients were reviewed every 3 months. Results and advice were sent to the GP. The GP was responsible for the implementation of the advised therapy.	RCT	84	140	No	20
Lenz [15]	7 NP	NP	Nurse is primary care provider with full authority to prescribe medication. Provided all ambulatory primary care, including 24-hour on call, and made independent decisions for referrals to specialists and hospitalizations.	RCT	23	24	No	17
Ovhed [16]	2 primary care centres	Practice nurse specially trained in diabetes care	Three patient visits per year to a nurse and one to a GP. Guidelines and check lists were used, taking into account different quality criteria.	POS	152	242	No	15
Peters [17]	1 medical centre	Nurses	Nurses made clinical diabetes management decisions based on specific detailed protocols that provided step-by-step instructions for diabetes and lipid management, appointments were scheduled on a quarterly basis.	POS	97 (90.7% type 2)	67 (95.5% type 2)	Yes	15
Ubink-Veltmaat [18]	Group A: 32 GP Group B: 21 GP	DSN Ophthalmologist → DSN	(A) Extensive support DSN: performs the annual examination, one-on-one education, fundus photography, on-demand consultation possibility. (B) Limited support DSN: support the GP by possibility of direct access to on-demand consultation with DSN.	POS	A: 1244 B: 842	400	Yes	20
Vrijhoef [19]	11 GP	DSN	Direct patient care, coordination and organization of care, consultation and advancement of expertise. Diabetes nurse is main care provider.	PP*	175	–	NA	18

*Additional comparisons with a simultaneous beginning study on outpatient care where made, data not shown.
C, control; DSN, diabetes specialized nurse; GP, general practitioner; I, intervention; NP, nurse practitioner; PCP, primary care provider; PN, practice nurse; POS, prospective observational study; PP, pre-test post-test design; RCT, randomized controlled trial.

Table 2 Outcomes of the studies included on the task delegation from GPs to nurses

	HbA1c (%)				Blood pressure (mmHg)				Cholesterol (mmol L^{-1})				
	Intervention		Control		Intervention		Control		Intervention			Control	
Author	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up		Baseline	Follow-up	Baseline	Follow-up
Aubert	9.0 (–)	7.3 (–)‡	8.9 (–)	8.2 (–)‡	Mean change SBP 1.9/DBP –0.8		Mean change SBP 6.1/DBP 1.5		TC	Mean change –0.31		Mean change –0.19	
Cleveringa	7.0 (0.9)‡‡	6.8 (0.9)‡‡	–	–	149/83‡‡ (17.8)/(8.9)	143/80‡‡ (17.8)/(8.9)	–	–	TC	5.2 (0.9)‡‡	4.8 (0.9)‡‡	–	–
Forbes	6.1 (1.3)	7.1 (1.4)	–	–	170/80 (33.1/11.7)	162/82 (21.3/9.4)	–	–	TC	5.5 (1.5)	4.7 (0.5)	–	–
Gabbay	7.4 (1.5)	7.45 (1.4)	7.36 (1.4)	7.4 (1.8)	136/77 (18/9)	129‡/72‡ (18/9)	137/77 (19/10)	138‡/78‡ (19/10)	LDL	2.7 (0.9)	2.6 (0.8)	2.7 (0.9)	2.5 (0.8)
Groeneveld	–	7.1 (1.2)	–	7.5 (1.8)	137§/81§ (21/9)	135§/80§ (18/8)	149§/86§ (24/9.7)	143§/82§ (21/9)	TC	6.2 (1.2)	6.1 (1.2)	6.2 (1.3)	6.1 (1.0)
Lenz	–	8.9 (2.8)	–	10.3 (3.9)	–	–	–	–		–	–	–	–
Ovhed	–	6.9 (1.6)††	–	7.7 (2.0)	–	154.2/83.5§ (21.9/10.7)	–	155.5/87.1§ (21.5/8.8)		–	–	–	–
Peters	11.9† (–)§	8.8† (–)‡	10.0† (–)§	10.0† (–)‡	136/82	–	137/80	–		–	–	–	–
Ubink-Veltmaat	A: 7.5 (–)¶ B: 7.3 (–)¶	*	7.3 (–)¶	*	A:155¶/84 B: 150¶/83 (–/–)	*	152¶/84 (–/–)	*	TC	A: 5.7 (–)¶ B: 5.5 (–)¶	–	5.9 (–)¶	–
Vrijhoef	8.0 (1.5)‡‡	7.7 (1.3)‡‡	–	–	–/84.6 (–)‡‡	–/80.6(–)‡‡	–	–	TC	5.7 (–)‡‡	5.6 (–)‡‡	–	–

Values are means ± standard deviations unless mentioned otherwise.

*Other outcome measurement: % patients who achieved target values.

†Value is median.

‡Significant difference between intervention and control with respect to change from baseline.

§Significant difference between intervention and control.

¶Single test for statistical differences between intervention A and B, and the control group.

††Due to less frequent recording at the control group no statistical comparison possible.

‡‡Significant difference between baseline and follow-up.

–, value is not measured/given; DBP, diastolic blood pressure; HbA1c, glycosylated haemoglobin; LDL, LDL cholesterol; SBP, systolic blood pressure; TC, total cholesterol.

exclusion were: the intervention did not meet the inclusion criteria (160); the study population did not meet inclusion criteria (29); the article, including the abstract was in a non-European language (2); and the articles reported results that duplicated contents of another publication (3). A full reference list of excluded studies is available from the authors. In the end, 10 studies satisfied our inclusion criteria (Table 1) [10–19]. Table 1 shows the characteristics of the included studies.

Study characteristics and quality assessment

The activities of the nurse could be divided into three distinct categories being: main care provider, only performing quarterly controls, or only carrying out the annual examination (Table 1). Only one study reported referrals between nurses, i.e. from a nurse case manager to a diabetes nurse educator [13]. Table 1 also shows the results of the quality assessment of the 10 included studies.

Results of the studies reviewed

Due to the large differences between the studies, both in design and statistical methods, it was not possible to perform pooled analyses. Of the 10 studies, seven showed a significant positive effect in one or more clinical outcome (Table 2). Four studies reported a change in the proportion of patients that reached the target values set in these studies [11,13,18,19]. In the study by Ubink-Veltmaat, the proportion of patients with a blood pressure less than or equal to 150/85 mmHg increased from 40% to 52% ($P < 0.001$) in intervention group A (extensive nurse support), and remained stable in intervention group B (limited nurse support) and the control group [18]. In the same study the percentage of patients with HbA1c less than 7.0% remained stable in both intervention groups, and decreased from 50% to 42% in the control group ($P < 0.05$). Vrijhoef *et al*. found a decrease in the proportion of patients with an HbA1c greater than 8.5%, from 26.6% at baseline to 20.3% at follow-up [19]. In the study by Gabby *et al.*, the percentage of patients in the intervention group with a blood pressure lower than 130/80 mmHg increased from 29% at baseline to 49% at the conclusion of the study [13]. Finally, Cleveringa *et al*. found, after 1 year, a significant increase in the percentage of patients with a HbA1c lower than 7.0% (from 61% to 67%, $P < 0.001$), blood pressure lower than 150/85 mmHg (from 49% to 62%, $P < 0.001$) and total cholesterol lower than 5.0 mol L^{-1} (from 47% to 63%, $P < 0.001$). After excluding lower quality studies [12,16,17], five out of the resulting seven studies showed a significant positive effect in one or more indices of clinical outcome. Thus, even after exclusion of the three lower quality studies the overall effect of the different interventions remains the same.

Discussion

This review yielded 10 intervention studies that studied delegation of GP tasks to a nurse working in diabetes primary care. Due to the heterogeneity of the studies and incomplete reporting of study outcomes, it was not possible to calculate an overall effect. However, none of the studies found a statistically significant negative effect for any of the clinical outcomes, that is, HbA1c, blood pressure and cholesterol. Seven studies found a statistically significant positive effect regarding these clinical outcomes. The majority of studies included in this review scored relatively low on the quality score list. This was mainly due to the design not being randomized, not being a blinded study and/or an insufficient number of participants. We also found that only four studies made comparisons with respect to changes from the baseline. Our findings indicate that interventions in which the nurse fulfils the role of the primary care provider results in larger effects on clinical outcomes than interventions where the nurse fulfils a smaller role. No major improvements in glucose control were found in the studies where the role of the nurse was limited to an annual review (with on-demand consultation possibilities). However, small sample sizes and an already good HbA1c at baseline require caution in drawing conclusions about the effect of the specific role of the nurse. Findings regarding the effect of the various nurses' roles remain inconclusive, as well as the effect of sharing tasks between nurses. The statistical significant effects on clinical outcomes found were all in favour of task delegation. Further research is necessary to determine other possible effects of the delegation of task, such as cost reduction, reduced workload for GPs, more education/information, and satisfaction of patients and health care professionals. Because of the methodological weaknesses of the available evidence, our conclusions will require confirmation in further studies. Moreover, the effect of the different roles of nurses remains unclear, making it virtually impossible to make evidence-based recommendations. Current evidence, however, appears to indicate that the delegation of GP tasks to a nurse in diabetes primary care is at the very least a promising option with respect to improving patient care. We contribute this Research Letter to the *Journal of Evaluation in Clinical Practice* as a call for research on the (cost) effectiveness of nurse delegation in diabetes care in particular and in health services in general.

Acknowledgements

The authors would like to thank Truus van Ittersum-Gritter for her assistance with the literature search and Dr Berrie Middel for his assistance with the preparation of the manuscript. The health insurance company De Friesland (De Friesland Zorgverzekeraar) provided financial support for this study.

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